

## **REMARKS**

Applicants have fully considered the Final Office Action of June 14, 2005. Applicants request reconsideration of the application. In view of the following remarks and arguments, Applicants request that the rejections of the claims be withdrawn and that a Notice of Allowance be issued.

In the Office Action, the Examiner rejected claims 2-4, 6, 13-18, and 21-32. Claims 2-4, 6, 13-18, and 21-32 remain pending.

The Examiner rejected claims 2-4, 6, 13-18, and 21-32 under 35 U.S.C. 103(a) as being unpatentable over EP 0402269. Applicants traverse this rejection.

Applicants submit that the claims are not obvious in view of EP 0402269. EP 0402269 fails to teach or suggest every feature set forth in the claims. For example, the EP 0402269 reference fails to teach or suggests a polythiophene of the formula set forth in claim 2 with a number average molecular weight of about 2,000 to about 100,000, a weight average molecular weight of about 4,000 to about 500,000, and a conductivity of from about  $10^{-6}$  to about  $10^{-9}$  S/cm. EP 0402209 does not render the claims obvious because it fails to reach or disclose every feature or limitation of the claims. M.P.E.P. § 2143.03.

Further, the claimed features are not inherent in the EP 0402269 reference. To be inherent, a property or feature must be a necessary result and not merely a possible result. The number average molecular weight ( $M_n$ ) depends on the total weight of all the polymer molecules in a sample divided by the total number of polymer molecules in a sample. The weight average molecular weight ( $M_w$ ) is essentially the weighted average of the molecular weight and accounts for each molecule's or chain's contribution to the measured result relative to its size. Thus, these values depend on the size and number of molecules in a polymer and are not inherent features of an oligomer segment. Applicants again point out that the EP 0402269 reference is directed to oligomers. Even if EP 0402269 similar oligomer segments, which Applicants submit it does not, similar oligomers do not teach or suggest providing a certain number or size of chains to provide a polymer having a particular  $M_w$  or  $M_n$ .

Further, there is nothing in the EP 0402269 reference that teaches or suggests polymers having the recited conductivities. As previously addressed in Applicants response of July 9, 2003, oligomers will behave differently from polymers and may not perform well as thin film transistors. In fact, the van Hutten reference that the Examiner later cites notes that regioregular thiophene polymers behave differently or exhibit different properties than the oligomers. Thus, a person skilled in the art would not be motivated by the teachings to modify EP 0402269 to arrive at the polythiophenes set forth in the claims.

The Examiner bears the burden to provide a basis in fact and/or technical reasoning to reasonably support that the determination that an allegedly inherent characteristic necessarily flows from the teachings of the prior art. Applicants submit the Examiner has not met this burden. The Examiner stated that the molecular weight values and the conductivity must be considered inherent because the references disclose all the requirements of the claimed composition. First, Applicant has demonstrated that the references do not teach all the features of the claimed composition. Second, Applicant has demonstrated that the molecular weight values and conductivity are not inherent features of a thiophene based polymer.

Applicants submit that the Examiner has not made out a *prima facie* case of obviousness in view of EP 0402269. The Examiner has not pointed to any specific portions of the reference outside of the disclosure of a general formula and variations thereof. The Examiner merely states that in view of the disclosure of a broad formula with many variations it would have been obvious to a person skilled in the art to modify the variations of the reference within the limitations of the instant claim. The fact that a person skilled in the art *could* modify the reference does not render a claim obvious unless the prior art suggests the desirability of the modification. M.P.E.P. § 2143.01. The Examiner has not shown where the EP reference teaches or suggests modifying the structures disclosed therein to arrive at the claimed polythiophenes.

Thus, in view of the foregoing, Applicants submit that the Examiner has not established a *prima facie* case of obviousness and that EP 0402269 does not render pending claims 2-4, 6, 13-18, and 21-32 obvious. Applicants request that the rejection of the claims in view of EP 0402269 be withdrawn.

Claims 2-4 were rejected under 35 U.S.C. 103(a) as being unpatentable over WO 9415368, or the Sato reference, or the van Hutten reference which were made of record on a Form 1449 filed May 30, 2003. Applicants traverse this rejection.

Applicants submit that none of the WO 9415368, Sato, or van Hutten references render claims 2-4 obvious. Applicants submit that the Examiner is applying the WO 9415368, Sato, and van Hutten references separately to claims 2-4 and not combining the references. This is based on the Examiner's use of the word "or" in the rejection and failure to use the word "and" when applying the references. Applicants will therefore treat each reference and their respective teachings separately.

Applicants submit that WO 9415368 does not render claims 2-4 obvious. The polymer set forth in WO 9415368 differs from the polymer set forth in the claims in that WO 9415368 is directed to block polymers that require  $\pi$ -conjugated blocks sandwiched between blocks having no  $\pi$ -conjugation. Even though WO 9415368 discloses thiophenes may be part of the  $\pi$ -conjugated block, the polymers of WO 9415368 require non  $\pi$ -conjugated blocks, such as, for example, oligosilanes and oligosiloxanes attached to the  $\pi$ -conjugation blocks. There is no teaching or suggestion to modify this reference by eliminating the blocks having no  $\pi$ -conjugation. Page 4 of WO 9415368 actually teaches that the tunable nature of the polymer is from the arrangement of conjugated blocks sandwiched between non-conjugated blocks. WO 9415368, therefore, teaches away from modifying the polymers by eliminating the non-conjugated blocks and teaches away from the polythiophenes of the present claims.

Addressing Figure 7, Applicants again note that this is only a dibromo thiophene precursor used in the synthesis of a polymer containing the non-thiophene  $\text{SiMe}_2$  unit (See Figure 8). Even if a person skilled in the art could modify the polymers of WO 9415368 to arrive at the claimed polymers, absent a teaching or suggestion to do so, the WO 9415368 cannot render claims 2-4 obvious. M.P.E.P. § 2143.01. As discussed above, there is no teaching or suggestion to modify the polymers of WO 9415368 in this manner.

Thus, considering the reference as a whole, WO 9415368 does not render claims 2-4 obvious.

Claims 2-4 are not obvious in view of van Hutten. The van Hutten reference is directed to the structure of thiophenes and the influence that structure has on the luminescence spectra. In particular, van Hutten is directed to approaches for controlling the luminescence wavelength. There is no teaching or suggestion of polythiophene conductivities, and there is no teaching or suggestion of polythiophenes having conductivities in the range cited in the present claims. For at least this reason, van Hutten fails to teach every feature of the claims and the claims, therefore, can not be obvious in view of van Hutten.

There is also no suggestion to modify the van Hutten reference to arrive at the present claims. The van Hutten reference is directed to controlling the luminescence wavelength of a thiophene based polymer by the structure of the polymer. To demonstrate the ability to control the luminescence wavelength of a thiophene, van Hutten compares (1) block copolymers having oligothiophene blocks that alternate with oligosilanylene blocks to (2) substituted regioregular polythiophenes. The van Hutten reference discloses that the silanylene-thiophene block copolymers exhibit similar absorption and fluorescence properties as compared to the thiophene oligomers, while the substituted polythiophenes are strongly red-shifted and do not exhibit desired properties or control of the luminescence properties. Further, the goal of van Hutten is to restrict the  $\pi$ -conjugation. The van Hutten reference, in fact, teaches that interrupting the  $\pi$ -conjugation of a thiophene polymer by introducing silicone atoms between thiophene rings is desirable, while merely adding substituents to a regular thiophene chain actually increases the size of the  $\pi$ -system. Thus, considering the reference as a whole, van Hutten teaches away from substituted regular thiophene polymers.

The mere fact that a person could modify the compositions of van Hutten to arrive at thiophenes with the features set forth in claim 2 does not render claim 2 obvious. There must be a suggestion to modify the reference. The van Hutten reference (1) fails to disclose any conductive properties of a polythiophene, and (2) teaches away from thiophenes that do not include a group, such as a silanylene, between thiophene units. The repeat units of the claimed thiophene do not include an interrupting group between thiophenes. Consequently, considering the reference as a whole, a person skilled in the art would not be motivated, other than through prohibited

hindsight, to modify van Hutten to arrive at the present claims. Applicants, therefore, submit that claim 2 is not obvious in view of van Hutten. Because van Hutten does not render claim 2 obvious, claims 3 and 4 which are dependent therefrom are also not obvious.

The Sato reference does not render claims 2-4 obvious. The Examiner has failed to show where the Sato reference teaches or suggests every limitation of claim 2. Specifically, the Examiner has failed to show where Sato teaches or suggests a polythiophene as set forth in claim 2 with a number average molecular weight of about 2,000 to about 100,000, a weight average molecular weight of from about 4,000 to about 500,000, and a conductivity of about  $10^{-6}$  to about  $10^{-9}$  S/cm. At the least, Sato teaches oligomers with a weight average molecular weight below the range set forth in claim 2. There is no suggestion of the desirability of having a larger weight average molecular weight.

Additionally, there is nothing in Sato to suggest the desirability of a polythiophene having a conductivity of about  $10^{-6}$  to about  $10^{-9}$  S/cm. While not disclosing any conductivities of the oligothiophenes disclosed in the reference, Sato actually teaches thiophenes having high conductivities. Specifically, Sato notes the interest in  $\pi$ -conjugated polymers because of their high electrical conductivities and notes a study of poly[3-(long alkyl)thiophenes] having conductivities from 10 to 95 S/cm. Thus, Applicant submits that Sato actually teaches away from the polythiophenes set forth in the present claims. The mere fact that a person could modify the disclosure to arrive at the polythiophenes set forth in the claims is not sufficient to establish a *prima facie* case of obviousness. There is nothing to motivate a person skilled in the art to modify Sato to arrive at the present claims other than through hindsight in view of the Applicants disclosure.

Sato also fails to teach any thiophenes that read on the formulas recited in claims 3 and 4. The oligomers in Sato include repeating units with three thienylene components of the general formulas: (substituted thienylene)-(unsubstituted thienylene)-(substituted thienylene). The repeating units of the formulas in claims 3 and 4 include at least 4 thienylene components. Further, unlike the oligomers of Sato, all but formula II-l and II-m have at least two non-substituted thienylenes between

substituted thienylene. Sato fails to read on formula II-l and II-m. Specifically, the repeat units of Sato result in the following sequence: (substituted)-(unsubstituted)-(substituted)-(substituted)-(unsubstituted)-(substituted). Formula II-l has a repeat unit of: (substituted)-(substituted)-(unsubstituted)-(unsubstituted)-(substituted)-(substituted). Formula II-m has a repeat unit with the sequence: (substituted)-(unsubstituted)-(substituted)-(unsubstituted)-(substituted)-(unsubstituted). The oligomers of Sato do not read on any of these formulas. Additionally, the location of the substituents, and the size of the mer units could affect the other claimed features, including the molecular weight values and the conductivity. Sato fails to teach or suggest modifying its disclosed oligomers to arrive at the formulas of claims 3 and 4. Even if a person skilled in the art could modify Sato's oligomers, that is not a sufficient basis to render the present claims obvious. For at least these reasons, claims 3 and 4 are not obvious in view of Sato.

Further, Applicants note that Sato is directed to oligothiophenes. As stated in Applicants response to a previous Office Action, oligomers are small molecules, not polymers, and will behave differently than polymers. The van Hutten reference cited by the Examiner even illustrates this. Thus, in view of the foregoing, Applicants submit that the Sato reference does not render claim 2, or claims 3 or 4 which are dependent therefrom, obvious.

In view of the foregoing, Applicants submit that neither WO 9415368, Sato, nor van Hutten render claims 2-4 obvious. Applicants request that the rejection of claims 2-4 be withdrawn.

For the reasons previously presented with respect to the EP 0402269 reference, Applicants submit the features of the present claims are not inherent in the WO 9415368, Sato, or van Hutten references.

In view of the foregoing, Applicants submit that claims 2-4 are not obvious in view of any of the WO 9415368, Sato or van Hutten references. Applicants request that the rejection be withdrawn.

**CONCLUSION**

For the reasons detailed above, it is submitted all claims remaining in the application (Claims 2-4, 6, 13-18, and 21-32) are now in condition for allowance.

In the event the Examiner considers personal contact advantageous to the disposition of this case, he is hereby authorized to call Richard M. Klein, at telephone number 216-861-5582, Cleveland, OH.

It believed that no fee is due in conjunction with this response. If, however, it is determined that fees are due, authorization is hereby given for deduction of those fees, other than the issue fees, from Deposit Account No. 24-0037.

Respectfully submitted,

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& McKEE, LLP

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